

THE INVENTION CLAIMED IS:

1. A tissue engineered construct analytical imaging system for use in connection with at least one culture well having a tissue engineered construct therein and positionable in an enclosed environment, the system comprising:

an imaging device in operational communication with the enclosed environment and configured to obtain data reflective of a well area of interest in the at least one culture well, without the removal of the culture well from the enclosed environment; and

a computer controller configured to at least one of:

(i) receive data from the imaging device;

(ii) analyze the data for determining at least one desired parameter within the well area of interest; and

(iii) output data reflecting results of an analysis.

2. The system of claim 1, wherein the imaging device is at least one of a camera, a digital camera, a scanner, a scanning device, a plurality of cameras, a video camera, a digital video camera and a device capable of capturing an image.

3. The system of claim 1, wherein the computer controller is at least one of a computing device, a computer, a personal computer, a controller, a circuit board, a laptop, a personal digital assistant, a networked computer and a server.

4. The system of claim 1, wherein the computer controller is further configured to control a mechanical loading mechanism for loading the tissue engineered construct.

5. The system of claim 1, wherein the at least one culture well is positionable upon the imaging device.

6. The system of claim 5, wherein the imaging device further comprises a transparent scanning surface, the at least one culture well positionable upon the transparent scanning surface.

7. The system of claim 1, wherein the well area of interest includes at least the tissue engineered construct in the culture well.

8. The system of claim 1, wherein the computer controller is further configured to expand, contract, manipulate and modify the well area of interest.

9. The system of claim 1, wherein data reflecting a plurality of well areas of interest is obtained by the imaging device.

10. The system of claim 9, wherein the data is obtained at at least one of various selectable points in time and for selectable capture periods.

11. The system of claim 1, wherein data reflective of a plurality of well areas of interest is obtained by the imaging device for a respective plurality of culture wells positioned within the enclosed environment.

12. The system of claim 11, wherein the computer controller is further configured to initiate the imaging device to obtain data reflective of a user-selected well default area of interest in at least one of the plurality of culture wells.

13. The system of claim 12, wherein the well default area of interest includes a construct area of interest.

14. The system of claim 13, wherein, based upon the image of the user-selected default area of interest and the construct area of interest, the computer controller is further configured to identify at least one subsequent construct area of interest in the data reflective of the plurality of well areas of interest of the subsequent plurality of culture wells.

15. The system of claim 14, further comprising a display device in communication with the computer controller, the display device configured to provide a user with a visual indication of an identified subsequent construct area of interest.

16. The system of claim 14, wherein the imaging device is further configured to obtain further data reflective of the construct areas of interest for at least one of a selected image cycle and a selected capture period.

17. The system of claim 16, wherein at least one of the selected image cycle and the selected capture period is user-selectable.

18. The system of claim 1, further comprising a storage device in communication with the computer controller and configured to store at least one of data, image data, well culture data, well area of interest data, construct area of interest data, incubator data, parameter data, digital input data and analog input data.

19. The system of claim 1, further comprising an input device in communication with the computer controller and configured to transmit user input commands to the computer controller.

20. The system of claim 1, further comprising a display device in communication with the computer controller and configured to display at least one of data, image data, well culture data, well area of interest data, construct area of interest data, incubator data, parameter data, digital input data, analog input data, user input data, graphical data, analytical results and images.

21. The system of claim 20, wherein the display device displays data stored on a storage device.

22. The system of claim 1, wherein, after the data is obtained by the imaging device and received by the computer controller, a user can manipulate at least one of the well area of interest and a construct area of interest for use in further data collection for the at least one well culture.

23. The system of claim 1, wherein the computer controller is further configured to uniquely identify a culture well in a plurality of culture wells.

24. The system of claim 23, wherein the unique identity of the culture well is a user-selectable identity.

25. The system of claim 1, wherein the well area of interest includes a construct area of interest, and wherein the desired parameter analyzed is the area of the tissue engineered construct within the construct area of interest.

26. The system of claim 25, wherein the analysis of the area includes overlaying a digital image of the tissue engineered construct in the construct area of interest with a computer graphical incremental pixel.

27. The system of claim 25, wherein the computer controller is further configured to calculate the area of the tissue engineered construct based upon the obtained data.

28. The system of claim 27, wherein the computer controller is further configured to calculate the area of the tissue engineered construct for a plurality of obtained data sets of the tissue engineered construct, each of the plurality of obtained data sets representing a unique point in time and while the respective culture well is positioned within the enclosed environment.

29. The system of claim 28, wherein the computer controller is further configured to plot the area of the tissue engineered construct versus time and display the resulting plot on a display device in communication with the computer controller.

30. The system of claim 1, wherein the tissue engineered construct is at least one of tissue, genetic material, bioartificial tissue, bioartificial tendon, a cellular construct and an organic construct.

31. The system of claim 1, wherein the tissue engineered construct is cells cultured in a three-dimensional collagen gel.

32. The system of claim 1, wherein the tissue engineered construct is anchored within the culture well on at least two ends thereof.

33. The system of claim 1, wherein the enclosed environment is an incubator apparatus.

34. The system of claim 1, further comprising an executable program installed on the computer controller and configured to permit a user to interact with the computer controller and input and receive data therefrom.

35. The system of claim 1, wherein the data reflective of the well area of interest is at least one of imaging data, visual data, visible light data, infrared data, ultraviolet data, magnetic resonance engineering data, computer tomography data, radiation data, and x-ray data.

36. A computer-implemented method of obtaining and analyzing images of a tissue engineered construct, the method comprising the steps of:

(a) positioning at least one culture well having the tissue engineered construct therein in an enclosed environment; and

(b) obtaining data reflective of a well area of interest in the at least one culture well, without the removal of the culture well from the enclosed environment.

37. The method of claim 36, further comprising the step of receiving the data reflective of the well area of interest.

38. The method of claim 36, further comprising the steps of:
analyzing the data; and

based upon this analysis, determining at least one desired parameter within the well area of interest based upon the data.

39. The method of claim 36, further comprising the step of outputting data reflecting results of the analysis.

40. The method of claim 36, wherein the data is obtained by an imaging device, wherein the imaging device is at least one of a camera, a digital camera, a scanner, a scanning device, a plurality of cameras, a video camera, a digital video camera and a device capable of capturing an image.

41. The method of claim 36, further comprising the step of controlling a mechanical loading mechanism for loading the tissue engineered construct.

42. The method of claim 36, wherein the well area of interest includes at least the tissue engineered construct in the culture well.

43. The method of claim 36, further comprising the step of at least one of expanding, contracting, manipulating and modifying the well area of interest.

44. The method of claim 36, further comprising the step of obtaining data reflecting a plurality of well areas of interest.

45. The method of claim 44, further comprising the step of obtaining the data at at least one of selectable points in time and for selectable capture periods.

46. The method of claim 36, further comprising the step of obtaining data reflective of a plurality of well areas of interest for a respective plurality of culture wells positioned within the enclosed environment.

47. The method of claim 46, further comprising the step of identifying a well default area of interest including a construct area of interest.

48. The method of claim 47, wherein, based upon the data reflective of the user-selected default area of interest and the construct area of interest, the method further includes the step of identifying a subsequent construct area of interest in the data reflective of the plurality of well areas of interest of the subsequent plurality of culture wells.

49. The method of claim 48, further comprising the step of displaying a visual indication of an identified subsequent construct area of interest.

50. The method of claim 48, further comprising the step of obtaining further data reflective of the construct areas of interest for at least one of a selected image cycle and a selected capture period.

51. The method of claim 50, wherein at least one of the selected image cycle and the selected capture period is user-selectable.

52. The method of claim 36, further comprising the step of storing at least one of data, image data, well culture data, well area of interest data, construct area of interest data, incubator data, parameter data, digital input data and analog input data.

53. The method of claim 36, further comprising the step of displaying at least one of data, image data, well culture data, stored data, well area of interest data, construct area of interest data, incubator data, parameter data, digital input data, analog input data, user input data, graphical data, analytical results and images.

54. The method of claim 36, wherein, after the data is obtained, the method further comprising the step of manipulating at least one of the well areas of interest and a construct area of interest for use in further data collection for the at least one well culture.

55. The method of claim 36, further comprising the step of uniquely identifying a culture well in a plurality of culture wells.

56. The method of claim 55, wherein the unique identity of the culture well is a user-selectable identity.

57. The method of claim 36, wherein the well area of interest includes a construct area of interest, and wherein the desired parameter analyzed is the area of the tissue engineered construct within the construct area of interest.

58. The method of claim 57, further comprising the step of overlaying a digital image of the tissue engineered construct in the construct area of interest with a computer graphical incremental pixel.

59. The method of claim 57, further comprising the step of calculating the area of the tissue engineered construct based upon the obtained data.

60. The method of claim 59, wherein, while a respective culture well is positioned within the enclosed environment, the method further comprises the step of calculating the area of the tissue engineered construct for a plurality of obtained data sets of the tissue engineered construct, each of the plurality of obtained data sets representing a unique point in time.

61. The method of claim 60, further comprising the step of plotting the area of the tissue engineered construct versus time.

62. The method of claim 61, further comprising the step of displaying the resulting plot.

63. The method of claim 36, wherein the tissue engineered construct is cells cultured in a three-dimensional collagen gel.

64. The method of claim 36, wherein the tissue engineered construct is at least one of tissue, genetic material, bioartificial tissue, bioartificial tendon, a cellular construct and an organic material.

65. The method of claim 36, wherein, prior to positioning the at least one culture well in the enclosed environment, the method further comprises the step of anchoring the tissue engineered construct within the culture well on at least two ends thereof.

66. The method of claim 36, wherein the data reflective of the well area of interest is at least one of imaging data, visual data, visible light data, infrared data, ultraviolet data, magnetic resonance engineering data, computer tomography data, radiation data, and x-ray data.

67. The method of claim 36, wherein the data is a digital image, the method further comprising the step of pre-defining the desired resolution of the digital image.

68. The method of claim 36, wherein the enclosed environment is an incubator apparatus.

69. A tissue engineered construct imaging and analysis apparatus for use in connection with at least one culture well having tissue engineered constructs therein and positionable in an enclosed environment, the apparatus comprising means for obtaining data reflective of a well area of interest in the at least one culture well, without the removal of the culture well from the enclosed environment.